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FLOOD INSURANCE STUDY

TOWNSHIP OF MOUNT PLEASANT, PENNSYLVANIA
COLUMBIA COUNTY

REVISED
APRIL 16, 1990

Federal Emergency Management Agency

COMMUNITY NUMBER - 421042

NOTICE TO
FLOOD INSURANCE STUDY USERS

Communities participating in the National Flood Insurance Program (NFIP) have established repositories of flood hazard data for floodplain management and flood insurance purposes. This Flood Insurance Study (FIS) may not contain all data available within the repository. It is advisable to contact the community repository for any additional data.

Part or all of this FIS may be revised and republished at any time. In addition, part of this FIS may be revised by the Letter of Map Revision (LOMR) process, which does not involve republication or redistribution of the FIS. It is, therefore, the responsibility of the user to consult with community officials and to check the community repository to obtain the most current FIS components.

Initial Flood Insurance Study Effective Date: February 19, 1981

Flood Insurance Study Revised: April 16, 1990

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FLOOD INSURANCE STUDY
TOWNSHIP OF MOUNT PLEASANT, COLUMBIA COUNTY, PENNSYLVANIA

1.0 INTRODUCTION

1.1 Purpose of Study

This Flood Insurance Study revises and updates a previous Flood Insurance Study/Flood Insurance Rate Map for the Township of Mount Pleasant, Columbia County, Pennsylvania. This information will be used by the Township of Mount Pleasant to update existing floodplain regulations as part of the Regular Phase of the National Flood Insurance Program (NFIP). The information will also be used by local and regional planners to further promote sound land use and floodplain development.

In some states or communities, floodplain management criteria or regulations may exist that are more restrictive or comprehensive than the minimum Federal requirements. In such cases, the more restrictive criteria take precedence and the state (or other jurisdictional agency) will be able to explain them.

1.2 Authority and Acknowledgments

The sources of authority for this Flood Insurance Study are the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973.

The hydrologic and hydraulic analyses in this study represent a revision of the original analyses prepared by the Susquehanna River Basin Commission (SRBC) for the Federal Emergency Management Agency (FEMA), under Contract No. H-3824. The work for the original study was completed in March 1978. The hydrologic and hydraulic analyses for the original study were conducted by Michael Baker, Jr., under subcontract to the SRBC. In this revision, the hydrologic and hydraulic analyses for Little Fishing Creek were prepared by the U. S. Geological Survey (USGS), for FEMA, during the preparation of the Flood Insurance Study for the Township of Madison. The work for this revision was completed in November 1988.

1.3 Coordination

On June 16, 1975, an initial Consultation and Coordination Officer's (CCO) meeting was held with representatives of FEMA, the township, and the USGS (the study contractor) to determine the streams to be studied by detailed methods. The Columbia County Planning Commission and the Susquehanna Economic Development Agency were contacted for information on the history of local flooding problems. The Pennsylvania Department of Community Affairs was given notice of the initiation of the study and was invited to attend the CCO meetings.

On May 16, 1979, a final CCO meeting was held with representatives of FEMA, the township, and the study contractor to review the results of the study.

2.0 AREA STUDIED

2.1 Scope of Study

This Flood Insurance Study covers the incorporated area of the Township of Mount Pleasant, Columbia County, Pennsylvania. The area of study is shown on the Vicinity Map (Figure 1).

Fishing Creek, Little Fishing Creek, and Appleman's Run were studied by detailed methods for their entire lengths within the community. This revision was carried out to incorporate updated hydrologic and hydraulic analyses for Little Fishing Creek, from a point approximately 50 feet upstream of Township Route 519 to the upstream corporate limits. The areas studied by detailed methods were selected with priority given to all known flood hazard areas and areas of projected development and proposed construction.

Tributary A to Little Fishing Creek was studied by approximate methods. Approximate analyses were used to study those areas having a low development potential or minimal flood hazards. The scope and methods of study were proposed to, and agreed upon by, FEMA and the Township of Mount Pleasant.

2.2 Community Description

The Township of Mount Pleasant is located in the west-central portion of Columbia County, in northeastern Pennsylvania. It is bordered by the Township of Greenwood to the north; the Township of Orange to the east; the Township of Scott and the Town of Bloomburg to the south; the Township of Hemlock to the west; and the Township of Madison to the northwest. The 1970 population was 672, a 2.6 percent increase since 1960. A total area of 16.8 square miles is included within the township.

The Township of Mount Pleasant lies within the Appalachian Ridge and Valley Province of Pennsylvania. No large mountain ridges pass through the township. The topography consists mainly of rolling hills and agricultural valleys. Tracts of gently sloping terrace land and level floodplain land can also be found along the major streams.

Climate in the area is continental, but it is modified by the effects of the Atlantic Ocean and the Gulf of Mexico. Mean annual temperatures range in the low 50s (degrees Fahrenheit). Annual precipitation averages approximately 37 to 40 inches, and is well-distributed throughout the year, with slightly over half falling between the months of April and September. During the summer months, the area is regularly subject to afternoon and evening thunderstorms often accompanied by heavy rains and damaging winds. In addition, remnants of hurricanes originating in the tropics occasionally pass through the vicinity, bringing prolonged periods of heavy rainfall.

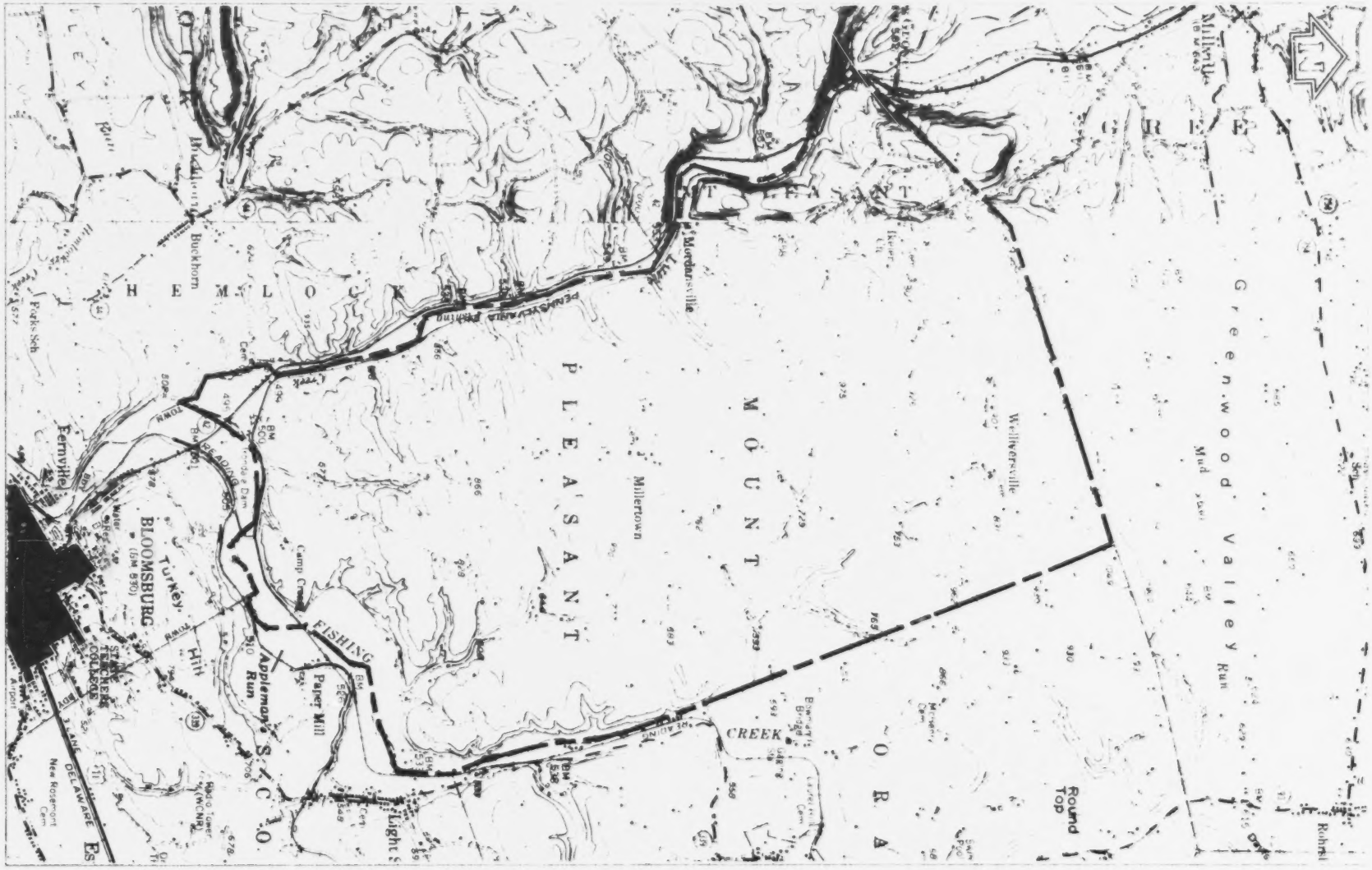


FIGURE 1

FEDERAL EMERGENCY MANAGEMENT AGENCY

TOWNSHIP OF MOUNT PLEASANT, PA
(COLUMBIA CO.)

APPROXIMATE SCALE

1 0 1 2 3 MILES

VICINITY MAP

3

Fishing Creek, which forms the entire southern and part of the eastern boundaries of the township, is the most prominent drainage feature. Little Fishing Creek, which forms most of the western boundary of the township, is the only other major stream.

Appleman's Run flows through an extremely small portion of the township before it enters Fishing Creek. Numerous small, unnamed tributary streams also traverse the township. Flood hazard areas along these streams are largely undeveloped; however, there are scattered pockets of residential development.

2.3 Principal Flood Problems

Fishing Creek and Little Fishing Creek are the chief sources of flooding within the township. Record flooding occurred on Fishing Creek in 1940 (peak discharge of 18,100 cubic feet per second - cfs); in 1972 (peak discharge of 30,900 cfs); and in 1975 (peak discharge of 29,400 cfs) at the gage near Orangeville (Reference 1). Approximately 12.5 inches of rainfall from Tropical Storm Agnes in 1972 produced severe runoff conditions which, in turn, caused extremely high flows on other local streams and tributaries.

During the 1972 "Agnes" flood, there were several trouble spots along both Fishing Creek and Little Fishing Creek. In the broad Fishing Creek floodplain near Light Street, farm buildings and croplands were overrun by floodwaters. Near the confluence of Fishing Creek and Little Fishing Creek, a large, flat tract of land with commercial and residential structures was completely flooded. Water entered the first floors of most structures forcing evacuation of individuals and personal property. First-floor flooding was also common at Mordansville, a small community along Little Fishing Creek. Elsewhere along Little Fishing Creek, a number of house trailers and a county-owned covered bridge were washed away. Following the passage of the storm, some minor repairs had to be made on township roads, and several streams had to be cleared of silt and other debris.

Tropical Storm Eloise in September 1975 resulted in similar flooding conditions. First-floor flooding was again widespread in the trouble spots mentioned above.

2.4 Flood Protection Measures

There are no local flood protection projects either existing or planned to alleviate flooding within the Township of Mount Pleasant.

3.0 ENGINEERING METHODS

For the flooding sources studied in detail in the community, standard hydrologic and hydraulic study methods were used to determine the flood hazard data required for this study. Flood events of a magnitude which are expected to be equaled or exceeded once on the average during any

10-, 50-, 100-, or 500-year period (recurrence interval) have been selected as having special significance for floodplain management and for flood insurance rates. These events, commonly termed the 10-, 50-, 100-, and 500-year floods, have a 10, 2, 1, and 0.2 percent chance, respectively, of being equaled or exceeded during any year. Although the recurrence interval represents the long term average period between floods of a specific magnitude, rare floods could occur at short intervals or even within the same year. The risk of experiencing a rare flood increases when periods greater than 1 year are considered. For example, the risk of having a flood which equals or exceeds the 100-year flood (1 percent chance of annual exceedence) in any 50-year period is approximately 40 percent (4 in 10), and, for any 90-year period, the risk increases to approximately 60 percent (6 in 10). The analyses reported herein reflect flooding potentials based on conditions existing in the community at the time of completion of this study. Maps and flood elevations will be amended periodically to reflect future changes.

3.1 Hydrologic Analyses

Hydrologic analyses were carried out to establish the peak discharge-frequency relationships for each flooding source studied in detail affecting the community.

The flood-frequency discharge values for the streams studied by detailed methods were determined using procedures outlined in USGS Bulletin 15 (Reference 2). For gaged sites, the flood frequency data were obtained directly from peak discharge data. For ungaged sites, it was necessary to regionalize the flood-frequency data for two or more sites.

For Fishing Creek, a statistical analysis was made of peak discharge records for the stream gage located approximately 0.9 mile upstream of the eastern corporate limits of the township. This gage has 37 years of record. The analysis followed the log-Pearson Type III method (Reference 2). The mean, M, and the standard deviation, S, obtained from the gage analysis were used to calculate coefficients C_m and C_s in the following equation:

$$M = C_m + 0.75 \log (A)$$

$$S = C_s - 0.05 \log (A)$$

in which A is the drainage area in square miles (Reference 2). The discharges for the Township of Mount Pleasant were determined using these coefficients and the appropriate drainage area.

A stream gage was in operation on Little Fishing Creek during the period from 1941 to 1958. This record was not deemed sufficiently representative of flooding characteristics and was not used. In the original study, the discharges for Little Fishing Creek were

determined using the same equations and coefficients as Fishing Creek with the respective drainage area, since Little Fishing Creek is a tributary to Fishing Creek. In this revision, hydrologic analyses for Little Fishing Creek were obtained from the Flood Insurance Study for the Township of Madison (Reference 3). In that study, flood frequency-discharge values were determined using regional regression equations developed using the Pennsylvania State University PSU-IV method (Reference 4). This technique was developed for specific use in estimating peak flood flows for ungaged sites on small streams in Pennsylvania. These determinations were confirmed using USGS Water Resources Investigations 82-21 (Reference 5).

The discharges for Appleman's Run were obtained from a unit hydrograph routing and combining procedure. The Soil Conservation Service (SCS) triangular unit hydrograph and runoff curve number procedure was used (Reference 6). The soils analysis was based on the soil survey for Columbia County (Reference 7). The subwatersheds were determined so as to best represent the effects of various tributaries. The convex method of flood routing was used (Reference 8).

Rainfall amounts were obtained from the rainfall duration frequency analysis prepared by the Pennsylvania State University (Reference 9). Rainfall time distribution was obtained from a Pennsylvania Department of Environmental Resources study (Reference 10). A 6-hour storm duration and an average antecedent moisture condition (Antecedent Moisture Condition II) were assumed. The times of concentration for each sub-watershed were obtained from the following equation (Reference 6):

$$T_c = \frac{11.9L^3}{H} \quad 0.385$$

The time of concentration, T_c, is defined as the time in hours that is necessary for a drop of water to travel from the furthest point on the watershed to the point of interest. In the above equation, L is the length of the longest watercourse in miles, and H is the difference in elevation between the highest point on the watershed and the point of interest, in feet.

The runoff curve number was adjusted in order to match the peaks obtained from averaging the discharges obtained from the following methods:

1. Modified PSU III
2. Rational
3. Hydrograph with 6-Hour Storm Duration, Antecedent Moisture Condition (AMC) II
4. Hydrograph with 6-Hour Storm Duration, AMC III (wet)
5. Hydrograph with 12-Hour Storm Duration, AMC II
6. Hydrograph with 12-Hour Storm Duration, AMC III
7. PSU IV

The Modified PSU III and PSU IV procedures, developed at the Pennsylvania State University, are based on the Gumbel method of flood frequency analysis and relate the mean annual flood to drainage area using a graph for different physiographic provinces (References 11 and 4). These graphs are based on regression analyses. The value of the T-year peak was obtained by multiplying the mean annual flood by a factor based on the average slope of the flood frequency line on dimensionless coordinates. These factors were modified in accordance with the comments by Aron and Rachford that the 100-year flood should be doubled as a result of the "Agnes" flood (Reference 12).

The Rational Method states that the peak runoff, Q; due to a rainfall of intensity, I, in inches per hour; over a drainage area, A, in acres; is given by Q = CIA where C is a coefficient based on soils and land use (Reference 13). The intensity of rainfall for a duration equal to the time of concentration was obtained from the Pennsylvania State University Publication No. 65 (Reference 9).

Two storage areas upstream of culverts on Appleman's Run were analyzed by routing the hydrographs through the culverts using the Puls method (Reference 14). Discharges in the vicinity of the gravel pits were reduced to reflect the small channel capacity and the resulting overflow into the gravel pits. Discharges at the mouth of Appleman's Run were obtained by combining the flow remaining in the channel with the runoff from the drainage area downstream of the overflow.

A summary of the drainage area-peak discharge relationships for the streams studied by detailed methods is shown in Table 1, "Summary of Discharges."

TABLE 1 - SUMMARY OF DISCHARGES

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. miles)	PEAK DISCHARGES (cfs) 10-YEAR	50-YEAR	100-YEAR	500-YEAR
FISHING CREEK					
At mouth	292.0	20,000	38,000	48,800	87,000
LITTLE FISHING CREEK					
At mouth	68.10	7,500	15,000	19,900	38,500
At Township Route 519	64.1	5,700	11,300	14,800	29,200
At a point approximately 1,000 feet downstream of Legislative Route 19058	62.2	5,660	11,100	14,600	28,900
At CONRAIL bridge	47.2	4,500	8,900	11,700	22,700
APPLEMAN'S RUN					
At mouth	2.39	390	470	510	630

3.2 Hydraulic Analyses

Analyses of the hydraulic characteristics of flooding from the sources studied were carried out to provide estimates of the elevations of floods of the selected recurrence intervals.

In this revision, the hydraulic analyses for Little Fishing Creek were taken from the Flood Insurance Study for the Township of Madison (Reference 3).

Cross sections were located at regular intervals along the stream length and at significant changes in ground relief, land use, and land cover. Ground elevations for the cross sections were photogrammetrically obtained as 1:200 scale base maps were compiled (Reference 15). The channel bottom elevations were taken from field-surveyed cross sections of the bottom with an interval distance of not more than 1,000 feet.

Locations of selected cross sections used in the hydraulic analyses are shown on the Flood Profiles (Exhibit 1). For stream segments for which a floodway was computed (Section 4.2), selected cross-section locations are also shown on the Flood Insurance Rate Map (Exhibit 2).

Water-surface elevations of floods of the selected recurrence intervals were computed in the original study using the COE HEC-2 step-backwater computer program (Reference 16). In this revision, water-surface elevations for Little Fishing Creek, from a point approximately 1,500 feet upstream of the confluence with Tributary A to the upstream corporate limits, were computed by modeling channel and bridge hydraulics with the USGS WSPRO step-backwater computer program (References 17 and 18).

Backwater elevations for Fishing Creek were started at its mouth using critical depth calculations developed by the SRBC. For Little Fishing Creek, backwater elevations were started at its mouth using coincident conditions with Fishing Creek, based on the assumption that both strams will peak concurrently. In this revision, starting elevations for Little Fishing Creek were determined using the slope/area method. For Appleman's Run, backwater elevations were started at its mouth using normal depth calculations for the 10- and 100-year floods. The 50- and 500-year floods were not started until further upstream, in the Township of Scott. Appleman's Run within the Township of Mount Pleasant is entirely controlled by Fishing Creek. The area of flooding south of Interstate Route 80 at the southern corporate limits is controlled by backwater from Fishing Creek through a culvert in the Town of Bloomsburg. Flood profiles

were drawn showing computed water-surface elevations for floods of the selected recurrence intervals.

Channel roughness factors (Manning's "n") used in the hydraulic computations were evaluated from aerial and ground level photographs, topographic maps, and on-site field examinations (Reference 15). The "n" values were selected from tables published by Ven Te Chow based on channel conditions, overbank vegetation and land use (Reference 19). For Fishing Creek, channel "n" values ranged from 0.036 to 0.044, and overbank "n" values ranged from 0.040 to 0.110. In the original analysis of Little Fishing Creek, channel "n" values ranged from 0.042 to 0.056, and overbank "n" values ranged from 0.045 to 0.100. In this revision, "n" values for Little Fishing Creek were assigned on the basis of engineering judgment and field inspection of the floodplain areas; channel "n" values ranged from 0.039 to 0.043, and overbank "n" values ranged from 0.045 to 0.095. For Appleman's Run, the channel "n" value was 0.050, and overbank "n" values ranged from 0.080 to 0.100.

The hydraulic analyses for this study were based on unobstructed flow. The flood elevations shown on the profiles are thus considered valid only if hydraulic structures remain unobstructed, operate properly, and do not fail.

All elevations are referenced to the National Geodetic Vertical Datum of 1929 (NGVD). Elevation reference marks used in this study are shown on the maps; the descriptions of the marks are presented in Elevation Reference Marks (Exhibit 3).

4.0 FLOODPLAIN MANAGEMENT APPLICATIONS

The NFIP encourages State and local governments to adopt sound floodplain management programs. Therefore, each Flood Insurance Study provides 100-year flood elevations and delineations of the 100- and 500-year floodplain boundaries and 100-year floodway to assist in developing floodplain management measures.

4.1 Floodplain Boundaries

To provide a national standard without regional discrimination, the 1 percent annual chance (100-year) flood has been adopted by FEMA as the base flood for floodplain management purposes. The 0.2 percent annual chance (500-year) flood is employed to indicate additional areas of flood risk in the community. For the streams studied in detail, the 100- and 500-year floodplain boundaries have been delineated using the flood elevations determined at each cross section. Between cross sections, the boundaries were interpolated using topographic maps at a scale of 1:2,400 with a contour interval of 5 feet (Reference 15).

For the stream studied by approximate methods, the 100-year floodplain boundaries were delineated using the Flood Hazard Boundary Map for the Township of Mount Pleasant (Reference 20).

The 100- and 500-year floodplain boundaries are shown on the Flood Insurance Rate Map (Exhibit 2). On this map, the 100-year floodplain boundary corresponds to the boundary of the areas of special flood hazards (Zones A and AE), and the 500-year floodplain boundary corresponds to the boundary of areas of moderate flood hazards. In cases where the 100- and 500-year floodplain boundaries are close together, only the 100-year floodplain boundary has been shown. Small areas within the floodplain boundaries may lie above the flood elevations but cannot be shown due to limitations of the map scale and/or lack of detailed topographic data.

For the streams studied by approximate methods, only the 100-year floodplain boundary is shown on the Flood Insurance Rate Map (Exhibit 2).

4.2 Floodways

Encroachment on floodplains, such as structures and fill, reduces flood-carrying capacity, increases flood heights and velocities, and increases flood hazards in areas beyond the encroachment itself. One aspect of floodplain management involves balancing the economic gain from floodplain development against the resulting increase in flood hazard. For purposes of the National Flood Insurance Program, a floodway is used as a tool to assist local communities in this aspect of floodplain management. Under this concept, the area of the 100-year floodplain is divided into a floodway and a floodway fringe. The floodway is the channel of a stream, plus any adjacent floodplain areas, that must be kept free of encroachment so that the 100-year flood can be carried without substantial increases in flood heights. Minimum federal standards limit such increases to 1.0 foot, provided that hazardous velocities are not produced. The floodways in this study are presented to local agencies as a minimum standard that can be adopted directly or that can be used as a basis for additional floodway studies.

The floodways presented in this study were computed for certain stream segments on the basis of equal conveyance reduction from each side of the floodplain. Floodway widths were computed at cross sections. Between cross sections, the floodway boundaries were interpolated. The results of the floodway computations are tabulated for selected cross sections (Table 2). The computed floodways are shown on the Flood Insurance Rate Map (Exhibit 2). In cases where the floodway and 100-year floodplain boundaries are either close together or collinear, only the floodway boundary is shown. Portions of the floodway widths for Fishing Creek and Little Fishing Creek extend beyond the corporate limits.

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION		
CROSS SECTION	DISTANCE [1]	WIDTH (FT.)	SECTION AREA (SQ. FT.)	MEAN VELOCITY (F.P.S.)	WITH FLOODWAY (NGVD)	WITHOUT FLOODWAY (NGVD)	DIFFERENCE (FT.)
Fishing Creek (continued)							
WX	28,980	481	6,068	8.0	515.9	515.2	0.7
WY	29,685	675[2]	7,285	6.7	516.9	516.2	0.7
WZ	30,045	646[2]	7,330	6.7	517.5	517.4	0.1
XA	30,455	627[2]	7,602	6.4	518.5	517.6	0.9
XB	30,925	837[2]	10,114	4.8	521.1	520.1	1.0
XC	31,469	1,786[2]	18,788	2.6	521.9	520.9	1.0
XD	31,968	1,709[2]	18,732	2.6	522.1	521.2	0.9
XE	32,348	1,675[2]	18,309	2.7	522.3	521.3	1.0
XF	32,698	1,607[2]	16,054	3.0	522.4	521.4	1.0
XG	33,378	1,626[2]	15,948	3.1	522.8	521.8	1.0
XH	34,103	1,238[2]	10,037	4.9	523.5	522.5	1.0
XI	34,528	1,130[2]	8,010	6.1	523.9	523.0	0.9
XJ	35,169	1,194[2]	8,058	6.1	526.0	525.1	0.9
XK	35,670	1,050[2]	6,159	7.9	527.5	526.5	1.0
XL	36,460	1,065[2]	8,775	5.6	530.2	529.4	0.8
XM	37,035	1,066[2]	10,269	4.8	531.2	530.3	0.9
XN	37,675	1,145[2]	9,061	5.4	531.8	531.0	0.8
XO	38,315	892[2]	6,820	7.2	532.5	531.5	1.0

[1]Feet above confluence with Susquehanna River
[2]This width extends beyond corporate limits

TABLE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY

TOWNSHIP OF MOUNT PLEASANT, PA
(COLUMBIA CO.)

FLOODWAY DATA

FISHING CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION		
CROSS SECTION	DISTANCE[1]	WIDTH (FT.)	SECTION AREA (SQ. FT.)	MEAN VELOCITY (F.P.S.)	WITH FLOODWAY (NGVD)	WITHOUT FLOODWAY (NGVD)	DIFFERENCE (FT.)
Fishing Creek							
WG	29,940	685[2]	10,142	4.8	500.2	500.0	0.2
WH	21,400	1,205[2]	15,877	3.1	500.6	500.1	0.5
WI	21,980	1,460[2]	17,591	2.8	501.0	500.2	0.8
WJ	22,395	1,045[2]	10,302	4.7	501.1	500.2	0.9
WK	22,815	894[2]	7,530	6.5	501.2	500.3	0.9
WL	23,380	915[2]	8,828	5.5	502.4	501.4	1.0
WM	24,010	780[2]	8,618	5.7	502.8	501.9	0.9
WN	24,620	595[2]	7,506	6.5	503.5	502.6	0.9
WO	25,175	495[2]	6,773	7.2	504.3	503.5	0.8
WP	25,640	379[2]	5,944	8.2	504.8	503.8	1.0
WQ	25,865	340[2]	5,305	9.2	505.1	504.1	1.0
WR	26,090	274	3,962	12.3	505.2	504.3	0.9
WS	26,365	207	3,164	15.4	505.6	504.7	0.9
WT	26,640	202	3,061	15.9	506.6	505.8	0.8
WU	27,445	195	3,365	14.5	510.2	509.9	0.3
WV	28,100	195	3,608	13.5	512.3	512.3	0.0
WW	28,480	268	3,749	13.0	513.1	513.1	0.0

[1] Feet above confluence with Susquehanna River
[2] This width extends beyond corporate limits

TABLE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY

TOWNSHIP OF MOUNT PLEASANT, PA
(COLUMBIA CO.)

FLOODWAY DATA

FISHING CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION		
CROSS SECTION	DISTANCE [1]	WIDTH [2] (FT.)	SECTION AREA (SQ. FT.)	MEAN VELOCITY (F.P.S.)	WITH FLOODWAY (NGVD)	WITHOUT FLOODWAY (NGVD)	DIFFERENCE (FT.)
Fishing Creek (continued)							
XP	38,555	918	9,843	5.0	536.0	535.4	0.6
XQ	39,290	943	10,277	4.7	536.5	535.7	0.8
XR	40,000	682	6,613	7.4	536.7	536.0	0.7
XS	40,430	473	6,272	7.8	537.4	536.4	1.0
XT	40,780	391	4,958	9.8	537.7	536.7	1.0
XU	41,465	473	5,377	9.1	539.6	538.6	1.0
XV	42,415	855	9,790	5.0	542.6	542.1	0.5
XW	43,115	1,016	11,690	4.2	543.6	543.2	0.4
XX	43,360	995	10,802	4.5	543.9	543.5	0.4
XY	44,265	650	6,946	7.0	545.4	545.1	0.3
XZ	44,535	643	7,911	6.2	546.4	545.9	0.5
YA	45,455	677	7,630	6.4	547.7	547.0	0.7
YB	46,215	604	7,372	6.6	549.3	548.8	0.5
YC	46,365	574	7,118	6.9	549.6	549.0	0.6
YD	47,270	431	5,061	9.6	551.1	550.6	0.5
YE	48,175	482	6,558	7.4	553.9	553.2	0.7
YF	48,970	455	5,840	8.4	555.2	554.3	0.9

[1]Feet above confluence with Susquehanna River
[2]This width extends beyond corporate limits

TABLE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY

TOWNSHIP OF MOUNT PLEASANT, PA
(COLUMBIA CO.)

FLOODWAY DATA

FISHING CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION		
CROSS SECTION	DISTANCE [1]	WIDTH [2] (FT.)	SECTION AREA (SQ. FT.)	MEAN VELOCITY (F.P.S.)	WITH FLOODWAY (NGVD)	WITHOUT FLOODWAY (NGVD)	DIFFERENCE (FT.)
Little Fishing Creek							
AA	570	399	6,802	2.9	500.7	500.0	0.7
AB	965	654	9,828	2.0	500.8	500.1	0.7
AC	2,315	700	10,840	1.8	500.9	500.2	0.7
ADA	2,645	820	9,158	2.2	501.0	500.3	0.7
ADB	3,100	919	7,633	2.6	501.0	500.3	0.7
ADC	3,655	1,070	7,806	2.5	501.2	500.4	0.8
ADD	4,160	562	4,314	4.6	501.6	501.0	0.6
ADE	4,790	456	3,040	6.5	502.4	501.6	0.8
ADF	5,255	358	2,365	8.4	503.5	502.9	0.6
ADG	5,540	275	2,170	9.2	505.0	504.4	0.6
ADH	5,875	312	2,803	7.1	507.2	506.3	0.9
ADI	6,405	347	3,266	6.1	508.8	507.9	0.9
ADJ	6,905	262	2,407	8.3	509.9	509.0	0.9
ADK	7,535	261	2,096	9.5	511.9	511.1	0.8
ADL	8,120	460	3,651	5.5	514.9	514.0	0.9
ADM	8,710	440	3,212	6.2	516.3	515.4	0.9
ADN	9,030	525	4,361	4.6	519.9	519.2	0.7
ADO	9,365	429	4,195	4.7	520.5	519.7	0.8

[1]Feet above confluence with Fishing Creek
[2]This width extends beyond corporate limits

TABLE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY

TOWNSHIP OF MOUNT PLEASANT, PA
(COLUMBIA CO.)

FLOODWAY DATA

LITTLE FISHING CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH[2] (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
					(FEET NGVD)			
Little Fishing Creek (continued)								
ADP	9,990	609	5,155	3.9	520.5	520.5	521.3	0.8
ADQ	10,650	522	3,667	5.4	521.3	521.3	522.1	0.8
ADR	11,125	461	3,144	6.3	522.3	522.3	523.2	0.9
ADS	11,820	203	1,766	11.3	524.3	524.3	525.2	0.9
ADT	12,205	183	1,932	10.3	526.9	526.9	527.5	0.6
ADU	12,710	184	2,021	9.8	529.2	529.2	529.9	0.7
ADV	13,375	236	2,286	8.7	531.6	531.6	532.5	0.9
ADW	13,910	199	2,147	9.3	533.2	533.2	534.2	1.0
ADX	14,530	238	2,590	7.7	535.6	535.6	536.4	0.8
ADY	14,700	228	2,937	6.8	536.4	536.4	537.0	0.6
ADZ	15,185	242	2,757	7.2	537.1	537.1	537.8	0.7
AEA	15,675	174	1,876	10.6	538.1	538.1	538.5	0.4
AEB	16,185	215	2,277	8.7	540.1	540.1	541.0	0.9
AEC	16,695	238	2,817	7.1	542.7	542.7	543.6	0.9
AED	17,460	161	1,723	11.5	543.7	543.7	544.5	0.8
AEE	17,595	189	2,413	6.1	546.9	546.9	547.9	1.0
AEF	18,190	219	2,246	6.6	547.8	547.8	548.6	0.8

[1]Feet above confluence with Fishing Creek
[2]This width extends beyond corporate limits

TABLE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY

TOWNSHIP OF MOUNT PLEASANT, PA

(COLUMBIA CO.)

FLOODWAY DATA

LITTLE FISHING CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH[2] (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
					FEET (NGVD)			
Little Fishing Creek (continued)								
AEG	18,700	244	2,382	6.2	548.8	548.8	549.6	0.8
AEH	19,200	211	2,319	6.4	549.7	549.7	550.4	0.7
AEI	19,860	178	1,823	8.0	550.7	550.7	551.2	0.5
AEJ	20,350	192	2,077	7.0	551.9	551.9	552.6	0.7
AEK	20,729	205	2,200	6.6	552.5	552.5	553.3	0.8
AEL	20,975	189	2,169	6.7	553.1	553.1	553.5	0.4
AEM	21,580	278	2,635	5.5	553.9	553.9	554.5	0.6
AEN	22,205	297	3,040	4.8	555.1	555.1	555.6	0.5
AEO	22,995	357	3,222	4.5	555.9	555.9	556.5	0.6
AEP	23,720	416	3,367	4.3	556.4	556.4	557.4	1.0
AEQ	24,170	300	1,890	7.7	557.1	557.1	558.0	0.9
AER	24,685	298	2,077	7.0	559.1	559.1	560.0	0.9
AES	25,075	287	2,097	7.0	560.5	560.5	561.0	0.5
AET	25,740	479	2,662	5.5	262.4	262.4	262.9	0.5
AEU	26,325	519	3,861	3.8	564.2	564.2	565.1	0.9
AEV	27,210	433	2,536	5.8	566.1	566.1	566.8	0.7
AEW	27,500	381	2,730	5.4	566.8	566.8	567.7	0.9

[1]Feet above confluence with Fishing Creek
[2]This width extends beyond corporate limits

TABLE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY

TOWNSHIP OF MOUNT PLEASANT, PA

(COLUMBIA CO.)

FLOODWAY DATA

LITTLE FISHING CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH[2] (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
					(FEET NGVD)			
Little Fishing Creek (continued)								
AEX	28,015	219	1,892	7.7	568.5	568.5	569.0	0.5
AEY	28,415	178	2,212	6.6	572.5	572.5	572.5	0.0
AEZ	28,910	183	2,034	7.2	572.8	572.8	573.1	0.3
AFA	29,685	201	2,060	7.1	573.9	573.9	574.7	0.8
AFB	29,985	194	1,789	8.2	574.4	574.4	575.1	0.7
AFC	30,415	200	2,078	7.0	576.1	576.1	576.8	0.7
AFD	31,030	191	2,241	5.2	578.2	578.2	578.2	0.0
AFE	31,215	179	1,748	6.7	578.5	578.5	578.5	0.0
AFF	31,495	180	1,967	6.0	580.2	580.2	580.2	0.0
AFG	31,665	165	2,093	5.6	580.3	580.3	580.3	0.0
AFH	31,990	181	1,936	6.0	580.3	580.3	580.5	0.2
Appleman's Run								
A*	495	31	169	3.0	506.3	506.3[3]	507.3	1.0

[1]Feet above confluence with Fishing Creek
[2]This width extends beyond corporate limits
[3]Elevation computed without consideration of backwater effects from Fishing Creek
*Cross section located within the floodway of Fishing Creek

TABLE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY

TOWNSHIP OF MOUNT PLEASANT, PA

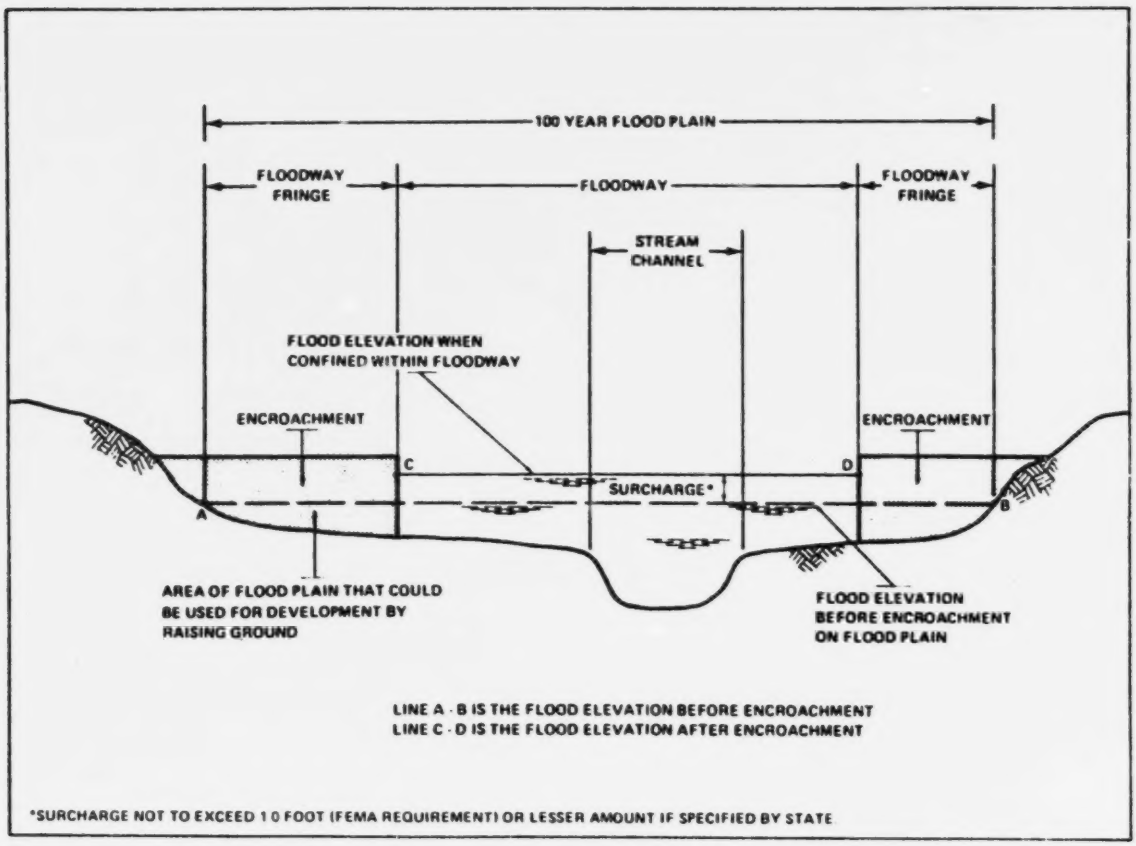
(COLUMBIA CO.)

FLOODWAY DATA

LITTLE FISHING CREEK AND APPLEMAN'S RUN

The area between the floodway and 100-year floodplain boundaries is termed the floodway fringe. The floodway fringe encompasses the portion of the floodplain that could be completely obstructed without increasing the water-surface elevation of the 100-year flood by more than 1.0 foot at any point. Typical relationships between the floodway and the floodway fringe and their significance to floodplain development are shown in Figure 2.

Near the mouths of streams studied in detail, floodway computations are made without regard to flood elevations on the receiving water body. Therefore, "Without Floodway" elevations presented in Table 2 for certain downstream cross sections of Appleman's Run are lower than the regulatory flood elevations in that area, which must take into account the 100-year flooding due to backwater from other sources.


100 YEAR FLOOD PLAIN
FLOODWAY FRINGE
FLOODWAY
FLOODWAY FRINGE
STREAM CHANNEL
FLOOD ELEVATION WHEN CONFINED WITHIN FLOODWAY
ENCROACHMENT
ENCROACHMENT
C
D
SURCHARGE*
A
B
AREA OF FLOOD PLAIN THAT COULD BE USED FOR DEVELOPMENT BY RAISING GROUND
FLOOD ELEVATION BEFORE ENCROACHMENT ON FLOOD PLAIN
LINE A - B IS THE FLOOD ELEVATION BEFORE ENCROACHMENT
LINE C - D IS THE FLOOD ELEVATION AFTER ENCROACHMENT
*SURCHARGE NOT TO EXCEED 1.0 FOOT (FEMA REQUIREMENT) OR LESSER AMOUNT IF SPECIFIED BY STATE

FLOODWAY SCHEMATIC Figure 2

5.0 INSURANCE APPLICATIONS

For flood insurance rating purposes, flood insurance zone designations are assigned to a community based on the results of the engineering analyses. The zones are as follows:

Zone A

Zone A is the flood insurance rate zone that corresponds to the 100-year floodplains that are determined in the Flood Insurance Study by approximate methods. Because detailed hydraulic analyses are not performed for such areas, no base flood elevations or depths are shown within this zone.

Zone AE

Zone AE is the flood insurance rate zone that corresponds to the 100-year floodplains that are determined in the Flood Insurance Study by detailed methods. In most instances, whole-foot base flood elevations derived from the detailed hydraulic analyses are shown at selected intervals within this zone.

Zone AH

Zone AH is the flood insurance rate zone that corresponds to the areas of 100-year shallow flooding (usually areas of ponding) where average depths are between 1 and 3 feet. Whole-foot base flood elevations derived from the detailed hydraulic analyses are shown at selected intervals within this zone.

Zone AO

Zone AO is the flood insurance rate zone that corresponds to the areas of 100-year shallow flooding (usually sheet flow on sloping terrain) where average depths are between 1 and 3 feet. Average whole-depths derived from the detailed hydraulic analyses are shown within this zone.

Zone A99

Zone A99 is the flood insurance rate zone that corresponds to areas of the 100-year floodplain that will be protected by a Federal flood protection system where construction has reached specified statutory milestones. No base flood elevations or depths are shown within this zone.

Zone V

Zone V is the flood insurance rate zone that corresponds to the 100-year coastal floodplains that have additional hazards associated with storm waves. Because approximate hydraulic analyses are performed for such areas, no base flood elevations are shown within this zone.

Zone VE

Zone VE is the flood insurance rate zone that corresponds to the 100-year coastal floodplains that have additional hazards associated with storm waves. Whole-foot base flood elevations derived from the detailed hydraulic analyses are shown at selected intervals within this zone.

Zone X

Zone X is the flood insurance rate zone that corresponds to areas outside the 500-year floodplain, areas within the 500-year floodplain, and to areas of 100-year flooding where average depths are less than 1 foot, areas of 100-year flooding where the contributing drainage area is less than 1 square mile, and areas protected from the 100-year flood by levees. No base flood elevations or depths are shown within this zone.

Zone D

Zone D is the flood insurance rate zone that corresponds to unstudied areas where flood hazards are undetermined, but possible.

6.0 FLOOD INSURANCE RATE MAP

The Flood Insurance Rate Map is designed for flood insurance and floodplain management applications.

For flood insurance applications, the map designates flood insurance rate zones as described in Section 5.0 and, in the 100-year floodplains that were studied by detailed methods, shows selected whole-foot base flood elevations or average depths. Insurance agents use the zones and base flood elevations in conjunction with information on structures and their contents to assign premium rates for flood insurance policies.

For floodplain management applications, the map shows by tints, screens, and symbols, the 100- and 500-year floodplains. Floodways and the locations of selected cross sections used in the hydraulic analyses and floodway computations are shown where applicable.

7.0 OTHER STUDIES

Flood Insurance Studies have been prepared for the Townships of Madison, Hemlock, Orange, and Scott; and the Town of Bloomsburg (References 3, 21, 22, 23, and 24). The results of this study are in exact agreement with the results of those studies.

Because it is based on more up-to-date analyses, this study supersedes the previously published Flood Insurance Study for the Township of Mount Pleasant (Reference 25).

8.0 LOCATION OF DATA

Information concerning the pertinent data used in preparation of this study can be obtained by contacting FEMA, the Natural and Technological Hazards Division, Liberty Square Building (Second Floor), 105 South Seventh Street, Philadelphia, Pennsylvania 19106.

9.0 BIBLIOGRAPHY AND REFERENCES

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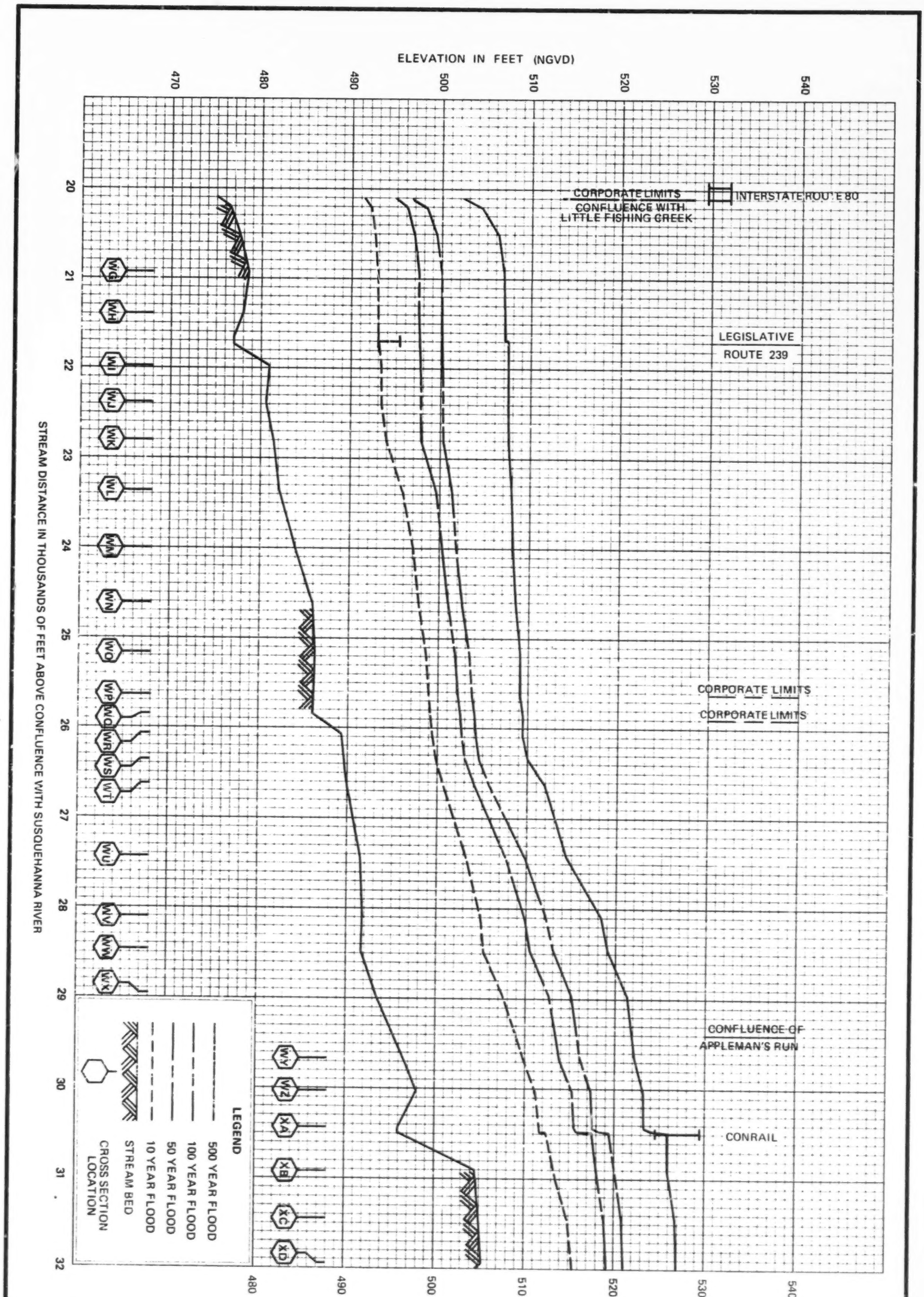
EXHIBIT 3 - ELEVATION REFERENCE MARKS

Reference Mark	FIRM Panel	Elevation (Feet NGVD)	Description of Location
RM 1	05	577.20	USGS standard disk, located in southwest wing wall of bridge on State Route 42 over Little Fishing Creek.
RM 2	05	568.72	PDH disk in top of southeast wing wall of concrete bridge on State Route 42, approximately 1,400 feet south of Little Fishing Creek.
RM 3	05	552.74	Chiseled square on west end of southeast concrete wing wall of Legislative Route 19058 bridge over Little Fishing Creek.
RM 4	05	545.34	Railroad spike driven vertically into north wing wall at west end of Township Route 519 bridge over Little Fishing Creek.
RM 5	10	518.15	Square cut in south wing wall at west end of covered bridge 69 over Little Fishing Creek.
RM 6	10	499.31	Square cut in top of southeast wing wall of State Route 42 bridge over Little Fishing Creek.
RM 7	10	437.61	USGS standard disk, stamped 15 CH 1942, located in concrete post along abandoned railroad, approximately 20 feet southeast of private crossing.
RM 8	10	533.25	PDOT disk stamped PDH located in southwest wing wall of Legislative Route 19026 bridge over Fishing Creek.
RM 9	10	526.31	USGS standard disk, stamped 14 CH 1942, in concrete post, approximately 120 feet north of concrete bridge over millrace.
RM 10	10	505.19	Chiseled square on top of retaining wall at Irondale Dam, approximately 100 feet north of gatehouse at southeast end of trestle over millrace.

EXHIBIT 3 - ELEVATION REFERENCE MARKS - continued

Reference Mark	FIRM Panel	Elevation (Feet NGVD)	Description of Location
RM 11	10	499.77	Railroad spike in large oak tree along south side of crossing between CONRAIL tracks and Legislative Route 19026.
RM 12	10	495.27	Standard USGS disk, Z 43 1943, in northwest wing wall of Legislative Route 239 bridge over Fishing Creek.



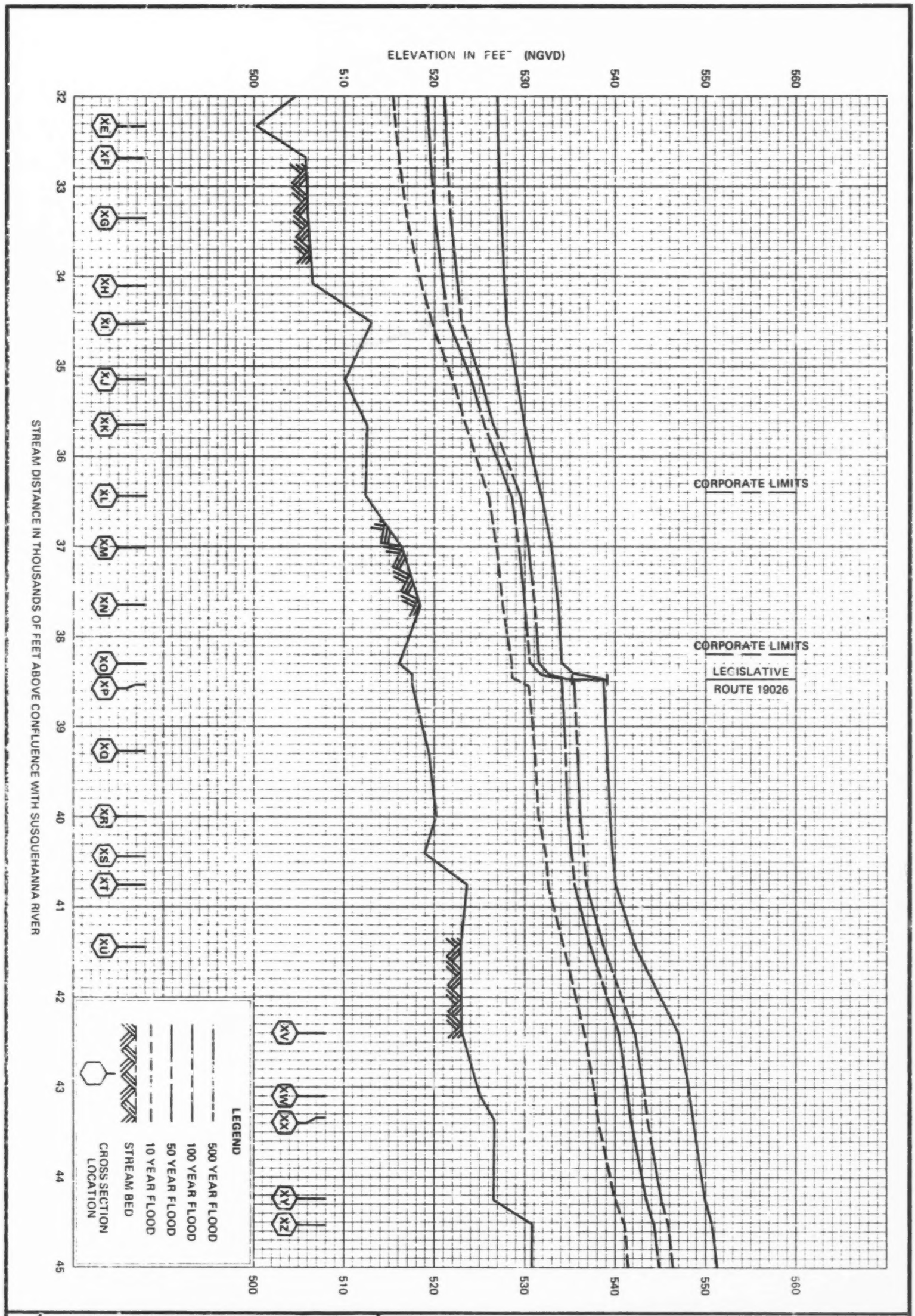
FEDERAL EMERGENCY MANAGEMENT AGENCY

TOWNSHIP OF MOUNT PLEASANT, PA
(COLUMBIA CO.)

FLOOD PROFILES

FISHING CREEK

01P



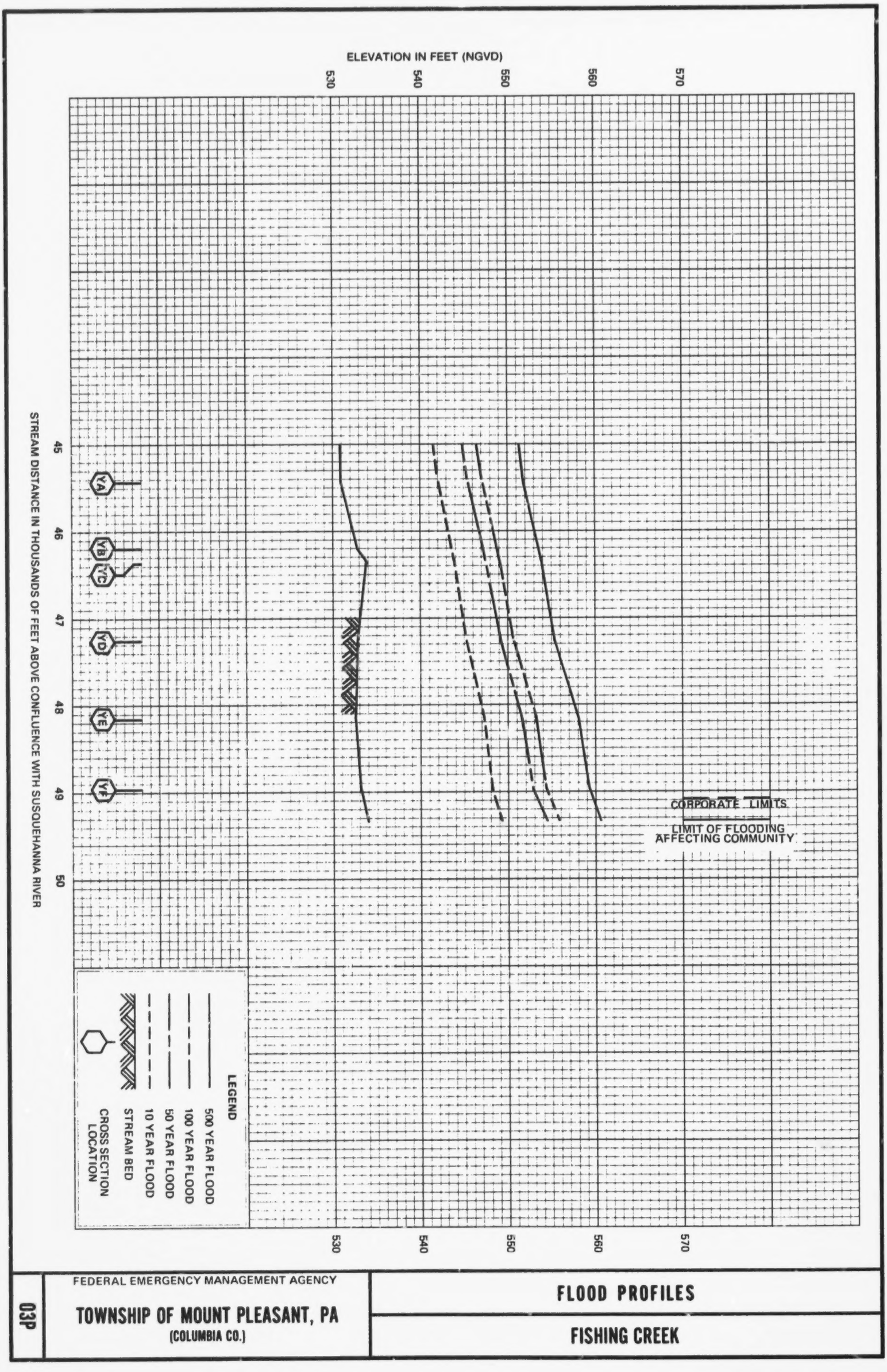
FEDERAL EMERGENCY MANAGEMENT AGENCY

TOWNSHIP OF MOUNT PLEASANT, PA
(COLUMBIA CO.)

FLOOD PROFILES

FISHING CREEK

020P



FEDERAL EMERGENCY MANAGEMENT AGENCY

TOWNSHIP OF MOUNT PLEASANT, PA
(COLUMBIA CO.)

03P

FLOOD PROFILES

FISHING CREEK

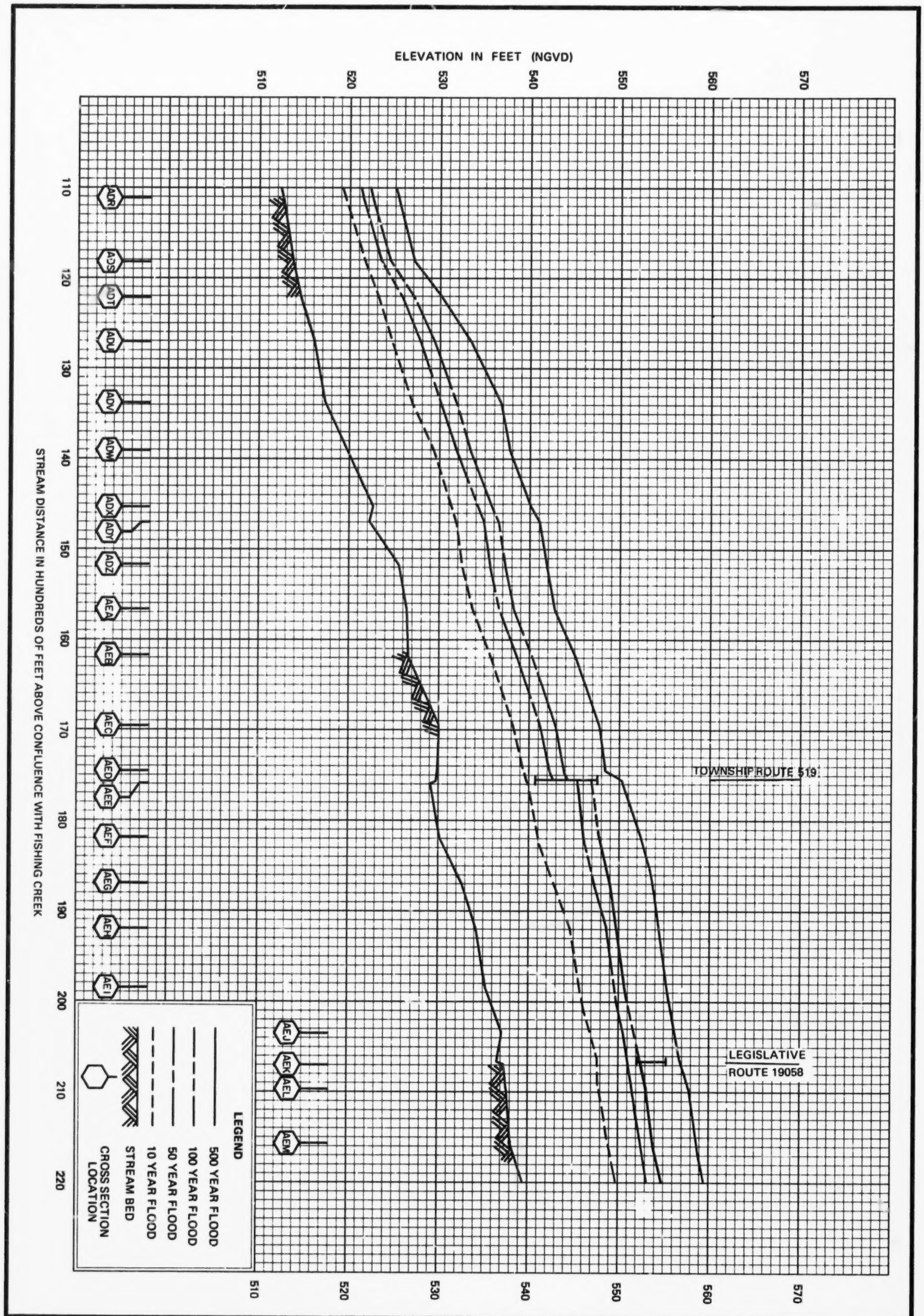
FLOOD PROFILES

LITTLE FISHING CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

TOWNSHIP OF MOUNT PLEASANT, PA
(COLUMBIA CO.)

04P



FEDERAL EMERGENCY MANAGEMENT AGENCY

TOWNSHIP OF MOUNT PLEASANT, PA
(COLUMBIA CO.)

FLOOD PROFILES

LITTLE FISHING CREEK

05P

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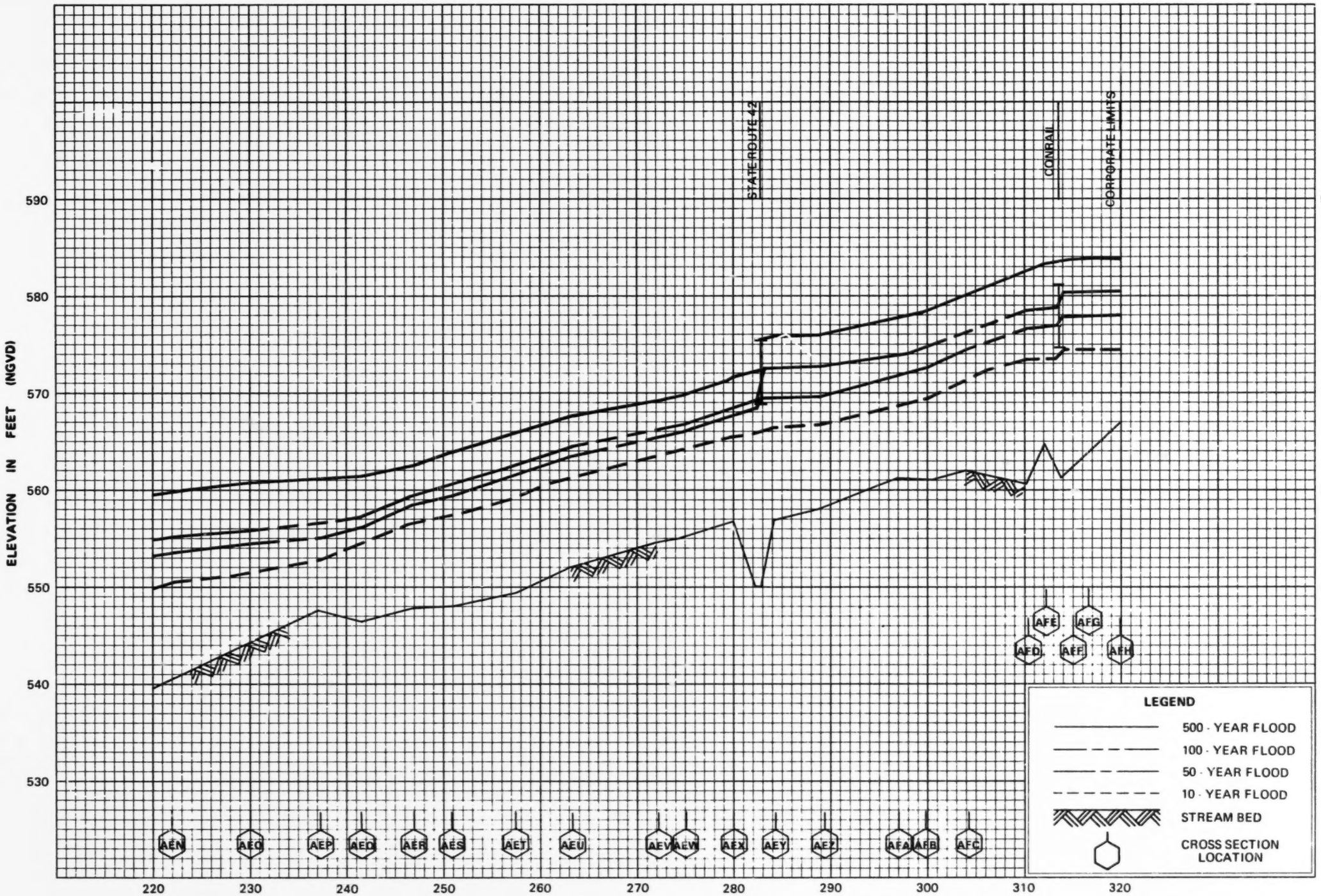


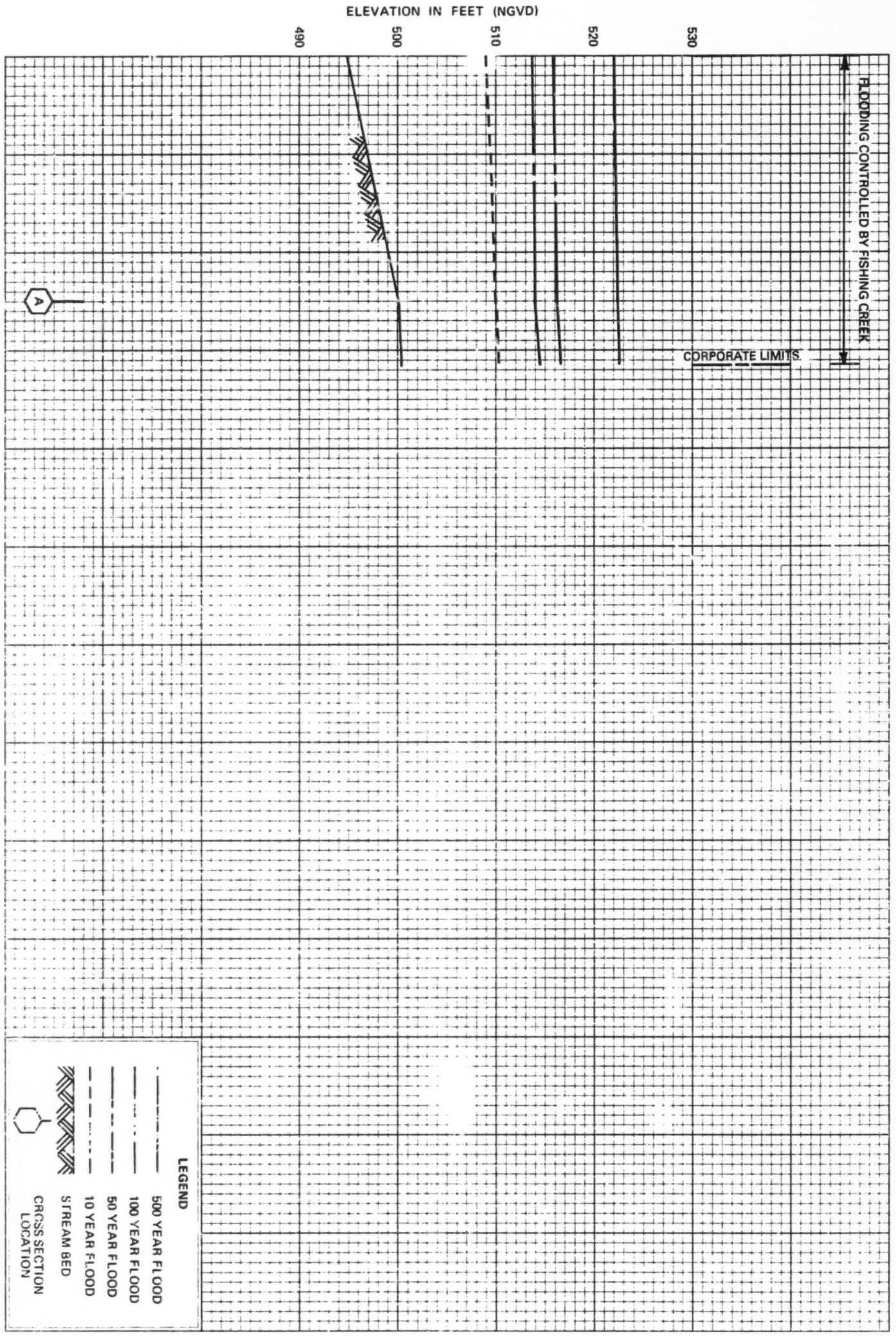
FLOOD PROFILES

LITTLE FISHING CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

TOWNSHIP OF MOUNT PLEASANT, PA
(COLUMBIA CO.)

06P



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07P	FEDERAL EMERGENCY MANAGEMENT AGENCY **TOWNSHIP OF MOUNT PLEASANT, PA** (COLUMBIA CO.)	**FLOOD PROFILES** **APPLEMAN'S RUN**